PJM Generator Interconnection Request
Queue #AC1-089
Wildcat 138 kV
Facilities Study

June 2018

AC1-089 Wildcat 138 kV

Facilities Study Report

A. Facilities Study Summary

1. Project Description

Willowbrook Solar I, LLC (Customer) proposes to install PJM Project #AC1-089, a 150.0 MW (57.0 MW Capacity) solar generating facility in Highland County, OH (see Figure 2). The point of interconnection for the generating facility will be a direct connection to AEP's Wildcat 138kV substation (see Figure 1).

The requested backfeed date is June 1, 2021.

The requested (Generation) in-service date is June 1, 2022.

2. Amendments/Changes to the Impact Study Report

No significant amendments/changes noted.

3. Interconnection Customer Schedule

PJM and AEP understand that the Customer has established the following schedule dates:

Receive back feed power from AEP: June 1, 2021
Commercial Operation Date: June 1, 2022

4. AEP's Scope of Work to Facilitate Interconnection

- To accommodate the interconnection at the existing Wildcat 138 kV substation the recommended improvements from the "CS160OHCS_Hillsboro-Maysville 138kV_Sag Study Report" dated December 7, 2018 should be applied to the Wildcat-Kenton Circuit of the Hillsboro-Maysville Line.

- At Wildcat Substation, installation of associated protection and control equipment, 138 kV line risers, SCADA, and 138 kV revenue metering will also be required. AEP reserves the right to specify the final acceptable configuration considering design practices, future expansion, and compliance requirements.

- It is understood that the Customer is responsible for all the connection costs associated with interconnecting the PJM project AC1-089 to the AEP transmission system. The cost of the Customer's generating facility and the costs for the line connecting the generating facility to AEP's Wildcat Substation are not included in this report; these are assumed to be the

Customer's responsibility. In addition, the Customer will be responsible for the cost of constructing a fiber-optic connection from their telecom equipment to AEP's Wildcat substation control house.

5. Description of Transmission Owner Facilities Included in the Facilities Study

Direct Connection Work

- AEP shall install two (2) additional 138kV circuit breakers and one line connection for the IPP at Wildcat Substation. The Wildcat 138kV bus will be reconfigured as a 4-breaker ring bus. Installation of associated protection and control equipment, 138 kV line risers, SCADA, and 138 kV revenue metering will also be required (see Figure 1).

- AEP shall install line protection and controls at the Wildcat 138 kV substation.

- AEP will expand the Wildcat Substation boundary fence, ground grid and gravel ~90 feet to the southwest.

- AEP will need to move structures 75A and 75B on the Hillsboro – Maysville 138kV line to accommodate the Wildcat station expansion.

- AEP will need to expand the Wildcat control house to accommodate the required communications and relaying equipment.

- Two fiber connections are required. AEP will extend the fiber-optic cables from the points of transition into the Wildcat control house. The Customer will be responsible for the fiber work on the IPP side of the points of transition.

Network Upgrade Work

A. Due to system overloads found during the PJM Study, the following Network reinforcements are required:

The Customer will be required to make modifications to the Hillsboro-Maysville Line to allow the line to be operated at its Maximum Operating Temperature (MOT). This project component addresses a clearance location of concern identified during a 2018 sag study analysis of the Hillsboro-Wildcat 138kV Circuit. The distribution pole of concern will be removed, a new distribution pole set on each side of the transmission line, and a tap rerouted to address the clearance concern.

6. Total Cost of Transmission Owner Facilities Included in the Facilities Study:

Direct Connection facilities $3,812,000

Network Upgrade facilities	$186,000
Total Cost	$3,998,000

The estimates do not include the impact that delays in obtaining ROW, permits or other approvals may have.

7. Summary of Schedule Milestones for Completion of Transmission Owner Work Included in Facilities Study:

Task	Dates
Engineering Start	1/15/2020
Material Ordered	2/1/2020
Construction Start (Grading & Below Grade)	8/1/2020
Construction Start (Above Grade)	2/1/2021
Outage requests made by	12/15/2019
Outage (Structure Foundations)	9/1/2020
Outage (Cut-In & Testing)	4/15/2021
Ready for back feed	6/1/2021
Generation In-Service Date	6/1/2022

Assumptions

- **ISA and ICSA executed by July 1, 2019**
- **AEP Internal Funding Approval by December 15, 2019**
- **System conditions allow scheduled outages to occur.**
- **The Customer will have their construction and required checkout completed prior to the start of the cut-in & testing outage.**

B. Transmission Owner Facilities Study Results

1. Transmission Lines – New

None

2. Transmission Lines – Upgrades

The Hillsboro – Maysville 138kV line has a distribution circuit crossing underneath structures 37-58 and 37-59. The distribution circuit will need to be relocated to allow the line to be operated at its MOT. This work is described in the sag study referenced in Section A-4.

3. Substation Facilities – New

None.

4. Substation Facilities – Upgrades

None.

5. Metering & Communications

Standard 138 kV metering will be installed at Wildcat Substation station. A standard station communication scheme will be used. All metering equipment shall meet the requirements as specified by AEP in the "AEP Metering and Telemetering Requirements for AEP Transmission Customers" document (SS-490011). Communication requirements are published in the "AEP SCADA RTU Requirements at Transmission Interconnection Facilities" (document SS-500000).

The Generation Interconnection Agreement does not in or by itself establish a requirement for American Electric Power to provide power for consumption at the developer's facilities. A separate agreement may be reached with the local utility that provides service in the area to ensure that infrastructure is in place to meet this demand and proper metering equipment is installed. The metering work above and cost indicated below does not include any potential work or cost to address metering requirements of the local service provider. It is the responsibility of the developer to contact the local service provider to determine if a local service agreement is required.

6. Environmental, Real Estate and Permitting Issues

The Customer is expected to obtain, at its cost, all necessary permits and provisions for the IPP station site adjacent to Wildcat.

7. Summary of Results of Study

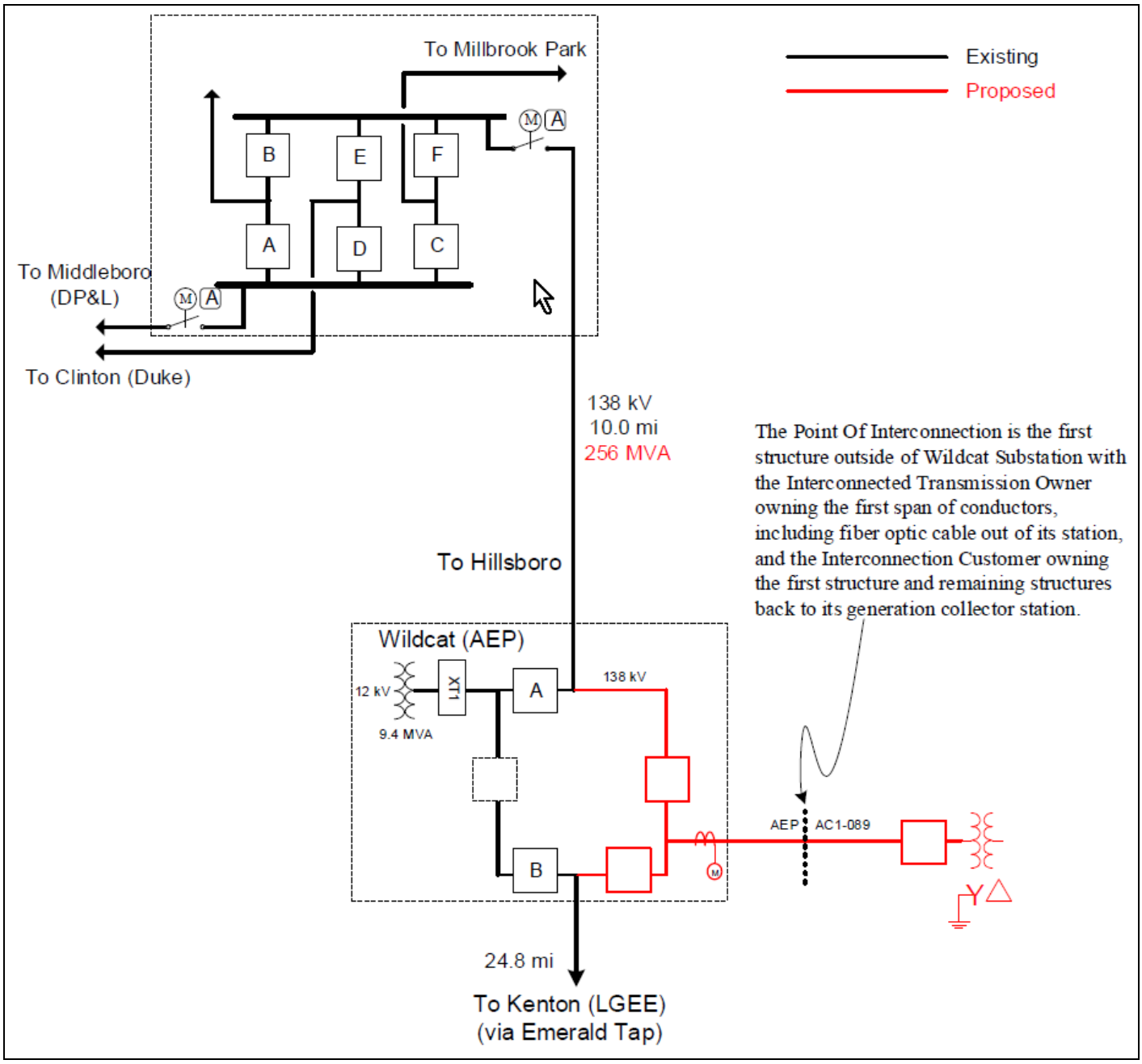
Cost Estimates for AEP

Task	Network Upgrade Number	Engineering	Material	Construction	Other	Total
Wildcat Station work including 2 new CBs	n5582	$300,000	$918,000	$1,650,000	$638,000	**$3,506,000**
Metering at Wildcat station	n5578	$22,000	$96,000	$126,000	$64,000	**$308,000**
Hillsboro-Maysville 138kV T-Line modifications	n5472	$91,000	$5,000	$51,000	$37,000	**$184,000**
	TOTAL	**$413,000**	**$1,019,000**	**$1,827,000**	**$739,000**	**$3,998,000**

8. Information Required for Interconnection Service Agreement

Description	DCF Facility	NUF Facility	Total
Direct Material	$1,013,000	$6,000	**$1,019,000**
Direct Labor	$2,097,000	$142,000	**$2,239,000**
Indirect Material	$201,000	$2,000	**$203,000**
Indirect Labor	$501,000	$36,000	**$537,000**
TOTAL	**$3,812,000**	**$186,000**	**$3,998,000**

Figure 1: Point of Interconnection (Wildcat 138 kV) One-Line Diagram



Coordinates of proposed station site:

Figure 2: Point of Interconnection (Wildcat 138 kV substation)

Latitude: 39.03291937, Longitude: -83.70099332